

# SOLUTIONS



## RESEARCH PROGRAMS SPRING 2007

### IN THIS ISSUE

#### PROJECT HIGHLIGHTS

Determining Current Rates of Motor Fuel Tax Evasion for the State of Montana

[Evaluation of Organic Matter Addition and Incorporation on Steep Cut Slopes: Phase II Test Plot Construction and Performance Monitoring](#)

[Evaluation of Wildlife Crossing Structures and Fencing on U.S. Highway 93 Evaro to Polson: Phase 1 Preconstruction Data Collection and Finalization of Evaluation Plan](#)

#### [NEW RESEARCH PROJECT IDEAS](#)

#### [LIBRARY CORNER](#)

#### [DID YOU KNOW?](#)

#### [NEW RESEARCH PROJECTS](#)

#### [CALENDAR OF EVENTS](#)

#### [NEW RESEARCH REPORTS](#)

#### [CONTACT US](#)

## PROJECT HIGHLIGHTS

### DETERMINING CURRENT RATES OF MOTOR FUEL TAX EVASION FOR THE STATE OF MONTANA

<http://www.mdt.mt.gov/research/projects/admin/evasion.shtml>

In the summer of 2004, the Montana Department of Transportation (MDT) initiated a research project to ascertain the amount of motor fuel tax evasion in our state.

The research shows there are incentives to evade motor fuel taxes in the State of Montana. Montana has among the highest motor fuel tax rates as compared to all bordering states, nearly twice those imposed in the State of Wyoming. Montana's gasoline excise tax rate, at 27 cents per gallon, is 7 cents per gallon more than the nationwide mean tax rate of 20.3 cents per gallon. Indeed, as of 2004, Montana imposed the fourth highest gasoline tax rate in the nation, notwithstanding any additional state sales taxes imposed on the sale of motor fuels. Montana's diesel tax rate is 27.75 cents per gallon.

Historic changes in legislation and increased enforcement and audit efforts have increased revenues deposited in Montana's Highway Special Revenue Account; yet, fuel tax evasion is still considered a significant and persistent problem. This research considered the nature of the problem and the extent of the resulting revenue losses in a quantitative and systematic manner.

Montana is not alone in its interest in curbing motor fuel tax evasion. State concern over motor fuel excise tax evasion has generated a concerted research effort over the past two decades, resulting in the detection of numerous evasion methods and the development of new approaches for measuring evasion and techniques for curtailing evasion. This study outlines numerous techniques that could be used to evade Montana motor fuel taxes, including:

- Border Schemes,
- Dyed Fuel Schemes,
- Alternative Fuels Schemes,
- International Fuel Tax Agreement (IFTA) Fraud,
- Refund and Credit Fraud,
- Daisy Chains, and
- Failure to File Schemes.



Based on the information on enforcement and compliance activities undertaken by MDT and other agencies examined in the report, as well as the results of the evasion analysis, numerous recommendations exist to close current enforcement gaps:

- Perform more distributor audits and modify auditing procedures.
- Expand field operations.
- Extend the statute of limitations for motor fuel tax fraud.
- Conduct analysis to determine correct power take-off rate schedule.
- Further examine economic and policy implications of moving point of taxation to terminal rack.
- Attempt to achieve total fuel accountability at all levels in the distribution chain.
- Perform random and targeted retailer audits.
- Require attendants at weigh stations and ports of entry to pull bills of lading from tanker trucks.
- Establish an Internet website for individuals to report incidents of evasion.
- Obtain and share data with neighboring jurisdictions on a more consistent basis.
- Maintain distributor/importer education program.
- Obtain and examine U.S. Customs data and compare

to tax records.

- Centralize fuel tax administration.
- Pierce the Corporate Veil.
- Authorize the examination of records, fuels, and equipment.
- Perform background checks/investigation of licensee applicants.
- Expand penalties and fines for non-compliance.

The divisions involved with Motor fuel tax reporting, auditing, evasion, and enforcement will use this report's recommendations to increase the efficiency and effectiveness of the existing motor fuel program. With MDT management approval, recommendations, such as: performing more distributor audits, reviewing PTO rate schedules, maintaining the distributor education program that can be put into practice without legislation, will be implemented. Other recommendations, such as: the statute of limitations, piercing the corporate veil, expanding penalties and fines for non-compliance will be presented to MDT management for future legislative consideration.

For more information, contact Craig Abernathy at 406-444-6269 or [cabernathy@mt.gov](mailto:cabernathy@mt.gov).





## **EVALUATION OF ORGANIC MATTER ADDITION AND INCORPORATION ON STEEP CUT SLOPES: PHASE II TEST PLOT CONSTRUCTION AND PERFORMANCE MONITORING**

[http://www.mdt.mt.gov/research/docs/research\\_proj/organic\\_matter/phaseii/final\\_report.pdf](http://www.mdt.mt.gov/research/docs/research_proj/organic_matter/phaseii/final_report.pdf)

Revegetation of steep cut slopes created during highway construction has proven problematic when topsoil cannot be replaced. Failure to establish robust, self-perpetuating vegetation cover may lead to increased maintenance costs and water quality problems due to storm water run-off.

In Montana, several types of geologic parent material have been identified that cause recurrent maintenance problems for the Montana Department of Transportation (MDT) when encountered on steep cut slopes. Alluvial rock, glacial till, and marine shale are difficult to revegetate, especially when exposed on south and west-facing aspects. Glacial till and alluvial rock are common in western Montana, while marine shale is common in eastern Montana.

In all three cases, limited vegetation develops following seeding into these nutrient poor parent materials on steep cut slopes without topsoil.

Significant erosion problems are generally a result of poor vegetation development, especially from highly erosive glacial till and marine shale deposits. Roadside ditches may become clogged with eroded sediment leading to increased maintenance costs, potential for rockfall, and long-term concern for road base stability due to subgrade saturation when drainage is restricted by sediment deposits.



Research test plots were constructed in 2003 and 2004 and monitored during three growing seasons to evaluate the effectiveness of compost application in improving vegetation development and decreasing erosion. A total of 20 plots were constructed on four different geologic parent materials: 10 plots in the vicinity of Happy's Inn along U.S. Highway 2 and 10 plots near Miles City near the U.S. Highway 12 junction with Interstate 94.

A compost blanket was applied to the mineral soil surface on half of the treated plots and incorporated into the upper 15 cm on the other half of the plots with a chisel plow. Two rates of compost application were evaluated and compared to a seeded control plot without compost. The high rate of compost application was a surface thickness of 5 cm, while the low rate was 2.5 cm.

Compost was applied on all steep slopes using a pneumatic blower truck. Incorporation of compost was performed by a chisel plow pulled by either a steel-tracked snowcat or specialty tractor suited to operation on slopes approaching 2H:1V. Topsoil was not used on any plots. Performance monitoring of the experimental treatments showed:

- Compost can be readily applied to steep slopes using a pneumatic blower truck.
- Vegetation establishment and persistence on all compost treated plots was enhanced compared to the control without compost, and often showed robust growth of the seeded species.
- Erosion was markedly reduced on the compost treated plots, while rills and surface flow patterns developed on control plots, especially the glacial till parent material.
- The compost blanket treatment performed as well as compost incorporated into the soil, yet without the additional costs and complexity associated with mechanical incorporation on-slope.
- Vegetation success was best on wetter sites in northwest Montana constructed on glacial till and alluvial rock, while drier sites in southeast Montana with marine shale parent material exhibited improved yet sparse vegetation development.



- Soil chemistry monitoring showed notable improvements in soil fertility in the compost treated plots.

Compost application on steep slopes is a viable technique for vegetation reestablishment and stormwater control. Compost suitable for use as a soil amendment is widely available throughout Montana and equipment is available to safely apply compost using pneumatic blower trucks.

Long-term persistence of seeded native species is probable when compost is used as a topsoil substitute on steep cut slopes leading to diminished erosion and enhanced slope stability.

For more information, contact Sue Sillick at 406-444-7693 or [ssillick@mt.gov](mailto:ssillick@mt.gov).

---

## **EVALUATION OF WILDLIFE CROSSING STRUCTURES AND FENCING ON U.S. HIGHWAY 93 EVARO TO POLSON: PHASE I PRECONSTRUCTION DATA COLLECTION AND FINALIZATION OF EVALUATION PLAN**

[http://www.mdt.mt.gov/research/docs/research\\_proj/wildlife\\_crossing/final\\_report.pdf](http://www.mdt.mt.gov/research/docs/research_proj/wildlife_crossing/final_report.pdf)

The reconstruction of U.S. Highway 93 (U.S. 93) on the Flathead Indian Reservation in northwestern Montana provides an opportunity to evaluate how wildlife crossing structures and wildlife fencing affect animal-vehicle collisions (AVC's) and wildlife movements in a multiple-use rural landscape.

Researchers at the Western Transportation Institute (WTI) recently completed a preconstruction field study establishing baseline data that will be used in a before-after comparative assessment of these wildlife mitigation measures that are being incorporated into the U.S. 93 reconstruction.

The first goal of the field study involves comparing AVC's before and after installation of the mitigation measures throughout the entire 56 mile US 93 corridor from Evaro to Polson.

Four years of reported preconstruction AVC data were analyzed to understand the statistical limitations that will affect the rigor of the analysis and interpretation of results, as well as to determine how preconstruction AVC's may have been affected by traffic activity patterns and volume.

The second goal of the field study will be accomplished by assessing deer and bear movements across U.S. 93 in the areas where the most extensive lengths of fencing and crossings will be installed (between Evaro and Saint Ignatius) before and after construction.

Prior to construction, sand track beds were used to sub-sample wildlife movements along the edge of the highway, providing an estimated total preconstruction crossing rate within the areas that will have the most extensive wildlife fencing.

This preconstruction estimated crossing rate will then be compared to post-construction numbers of observed wildlife movements through the crossing structures (the desired outcome) as well as around the ends of the fences to understand the effect of the fencing and crossings on wildlife connectivity.

Additionally, preconstruction photographic monitoring at an existing bridge confirmed daily patterns of activity in deer and bear moving under the highway, in addition to documenting other wildlife in the highway corridor.



To account for wildlife population fluctuations that could affect the interpretation of the effect of the mitigation, pellet group data were collected to index local deer population trends and a black bear study provided a count of genetically-unique black bears in the area using DNA extracted from bear hair snagged at sampling stations on both sides of the highway.

These indices will be used to better understand observed trends and changes in trends after construction as well as what factors may be driving potential changes in AVC occurrences and wildlife movements across the highway.

Analysis of the preconstruction data sets confirmed the need for several years of post-construction research in order to attain statistically significant outcomes that can better distinguish between the effects of the mitigation versus the influence of other factors.

In collaboration with MDT, CSKT and FHWA, WTI is developing the complementary post-construction monitoring plan. The agencies are working together to define "measures of effectiveness" (MOE's) that will be used to determine whether these mitigation measures achieve desired outcomes of reducing animal-vehicle collisions (AVC's) and maintaining or increasing wildlife movements across the US 93 corridor.

This effort will offer important insights into the design, construction, and monitoring of wildlife fencing and crossings to improve driver safety and ecological integrity.

For more information, contact Sue Sillick at 406-444-7693 or [ssillick@mt.gov](mailto:ssillick@mt.gov).





## NEW RESEARCH PROJECT IDEAS

Every year Research staff solicits for new research topics. Fourteen topics were submitted in the 2007 solicitation cycle. In order for topics to move forward beyond the solicitation stage, a champion and sponsor are required.

The Champion is a MDT employee who chairs the technical panel and shepherds the project from inception through implementation.

The Sponsor is a high level MDT Administrator who agrees to ensure implementation occurs, as appropriate.

Eight of the 14 topics submitted in this year's solicitation cycle either did not have a champion or a sponsor. One topic was funded through another office. Another topic was rejected due to a lack of partners. The remaining four research ideas submitted during the 2007 research solicitation were moved forward to technical panels:

- Growing Smart in Transportation and Development: Tools for State and Local Decisions Makers;
- Preventing Adverse Effects from Highway Noise: A Toolkit for Local Decision Makers;
- Soil Stabilization using By-products; and
- Varmint Impact on Shoulders and Paved Surfaces.

Technical panels are formed to investigate the problem and determine the research direction. First, technical panels determine if a research need truly exists and, if so, determines who should conduct the research. If the research is funded, the technical panel makes sure the research stays on track and the results are implemented, as appropriate.

For more information, contact Sue Sillick at 406-444-7693 or [ssillick@mt.gov](mailto:ssillick@mt.gov).

## LIBRARY CORNER

### WESTERN TRANSPORTATION KNOWLEDGE NETWORK

This past spring, librarians located within Region 4 of AASHTO met by teleconference to create a new resource sharing group called Western Transportation Knowledge Network (WTKN), which is loosely based on the [Midwest Transportation Knowledge Network](#).

Both groups consist of cooperating libraries that specialize in transportation and are dedicated to improving the transfer of information.

Goals of WTKN are to share library resources and enable participants to develop common principles, standards, and cooperative agreements. As technology makes more information available to users, the demands for refined information will increase.

Today's libraries and their staffs are expected to meet these demands. Librarians must be able to interpret

information, evaluate sources and formats, appraise technologies, and meet expectations about what libraries can provide. The benefit that individual transportation agencies derive from participation in WTKN depends upon the ability of libraries to make the most of such knowledge-sharing networks.

Along these lines, members of WTKN will be hosted for a first meeting by the Research and Innovative Technology Administration (RITA) in Irvine, California. At that time, objectives for WTKN will be clarified in regards to sharing resources, staff expertise, and cooperatively developed information.

For more information, contact Lisa Autio, 406-444-6125, or [laudio@mt.gov](mailto:laudio@mt.gov).



## DID YOU KNOW?

### What is a Community of Practice (CoP) and How is it Useful?

People in all occupations consult with one another when solving problems unique to their fields. This informal relationship among members of a group is called a community of practice. Today there are many groups discussing their common concerns online. Although people can discuss issues at annual conferences, online communities of practice can reveal many aspects of a particular issue.

Join an [FHWA community of practice](#):

- AASHTO Transportation Asset Management Today
- Disadvantaged Business Enterprise Exchange
- High Performance Concrete
- Highways for Life
- "It All Adds Up to Cleaner Air" Exchange
- LearningForum@FHWA
- Manual on Uniform Traffic Control Devices
- NTIMC Traffic Incident Management
- Performance Measurement Exchange
- RE: NEPA
- Real Estate Exchange
- Rumble Strips
- Safety Roadside Hardware
- National Transportation Operations Coalition
- Highway Performance Monitoring System (HPMS)
- Household Travel Data Program
- Knowledge Management Practice CoP
- LTPP Standard Data Release
- Marketing and Communications
- Midwestern Transportation Research Network
- Motor Fuel Reporting and HTF Attribution
- National Highway Visibility
- NCHRP 1-37A (Mechanistic-Empirical) Pavement Design Guide
- NorthWest Passage Transportation Pooled Fund Study
- NSTC Human Capacity In STEM Working Group
- Performance Measurement
- Program Delivery Assessment Tool
- Road Weather Management and Operations
- Rural ITS
- State Standards Engineer
- Surface Transportation Finance
- Tennessee Air Quality and Transportation Conformity
- Transportation Conformity
- Transportation Education and Research
- Travel Monitoring
- TRB International Sub-Committee of the Accessible Transportation and Mobility Committee A1E09
- Value Pricing
- Work Zones

[Highway Community Exchange](#) topics:

- Alternative Contracting
- Detectable Warnings
- Highway Finance Data Collection

For more information on communities of practice, contact Lisa Autio, (406) 444-6125, or [lautio@mt.gov](mailto:lautio@mt.gov).

## NEW RESEARCH PROJECTS

### Montana Summer Transportation Institute

<http://www.mdt.mt.gov/research/projects/admin/summer.shtml>

### Pacific Northwest Snowfighters

<http://www.pooledfund.org/projectdetails.asp?id=302&status=4>

A listing of all past and current projects can be found at:

[www.mdt.mt.gov/research/projects/sub\\_listing.shtml](http://www.mdt.mt.gov/research/projects/sub_listing.shtml)



## CALENDAR OF EVENTS

### June

TCRP Problem Statements Due (6/15)  
State CEO Ballot on NCHRP Program Due (6/25)  
MDT RRC Meeting (6/26)  
TRB Call for papers for 2008 Annual Meeting  
TRB Sponsor Funds Due

### July

Highways for LIFE Applications Due (7/16)  
Local Technical assistance Program (LTAP) Annual Meeting (7/23-7/26)  
MDT RRC Meeting (7/31)  
NCHRP Funding Due  
NCHRP Problem Statements Solicited

### August

TRB Annual Meeting Abstracts Due (8/1)  
AASHTO Research Advisory Committee National Meeting (8/6-8/9)  
MDT RRC Meeting (8/29)



### September

NCHRP Problem Statements Due (9/15)  
MDT RRC Meeting (9/25)  
AASHTO Annual Meeting (9/28-10/2)  
FHWA SPR Annual Work Plan Due (9/30)

### October

MDT RRC Meeting (10/30)  
AASHTO SCOR Meeting

TCRP Projects Selected  
TRB Annual Meeting Preliminary Announcement Distributed

### November

NCHRP Problem Submitters' Responses to Evaluations Due  
NCHRP Synthesis Topic Solicitation



## **NEW RESEARCH REPORTS**

**Determining the Current Rates of Motor Fuel Tax Evasion for the State of Montana**  
<http://www.mdt.mt.gov/research/projects/admin/evasion.shtml>

**Wildlife-Highway Crossing Mitigation Measures: a *Toolbox for Montana Department of Transportation***  
[http://www.mdt.mt.gov/research/projects/env/wildlife\\_crossing\\_mitigation.shtml](http://www.mdt.mt.gov/research/projects/env/wildlife_crossing_mitigation.shtml)

**Evaluation of Organic Matter Compost Addition and Incorporation on Steep Cut Slopes – *Phase II: Test Plot Construction and Performance Monitoring***  
[http://www.mdt.mt.gov/research/projects/env/organic\\_matter.shtml](http://www.mdt.mt.gov/research/projects/env/organic_matter.shtml)

**A High Fidelity Driving Simulator as a Tool for Design and Evaluation of Highway Infrastructure Upgrades**  
[http://www.mdt.mt.gov/research/docs/research\\_proj/high\\_fidelity/final\\_report.pdf](http://www.mdt.mt.gov/research/docs/research_proj/high_fidelity/final_report.pdf)

Find all past and current research projects here:  
[http://www.mdt.mt.gov/research/projects/sub\\_listing.shtml](http://www.mdt.mt.gov/research/projects/sub_listing.shtml)

### **REMINDER**

Information on research services and products, such as research and experimental project processes and reports, and technology transfer services, including our library catalog can be found on the Research web site at [www.mdt.mt.gov/research](http://www.mdt.mt.gov/research).

## **CONTACT US**

Sue Sillick – Research Manager  
406-444-7693  
[ssillick@mt.gov](mailto:ssillick@mt.gov)

Lisa Autio – Librarian  
406-444-6125  
[lautio@mt.gov](mailto:lautio@mt.gov)

Craig Abernathy – Project Manager  
406-444-6269  
[cabernathy@mt.gov](mailto:cabernathy@mt.gov)

Jeanne Nydegger – General Assistance  
406-444-6338  
[jnydegger@mt.gov](mailto:jnydegger@mt.gov)